

HABITS AND LIFE HISTORIES OF SOME VICTORIAN
LYCAENID BUTTERFLIES.

By A. N. BURNS, F.E.S.

Genus *Ogyris* Westwood.

This genus, which consists of no fewer than eleven species in Australia and two in New Guinea, represents some of the largest and most beautiful Australian Lycaenids. Five of the eleven species are taken in Victoria, and three of the five are rare, and restricted to the north-western portions of the State.

The larvæ of those species whose life histories are known are *Loranthus* (Mistletoe) feeders; are of very exclusive habits, feeding by night only, and sheltering by day in crevices, under bark, and in ants' nests. As *Ogyris* larvæ possess secretory glands on the posterior body segments, from which they exude a sweet substance, they are sought after and protected by ants, which continually attend them in order to obtain this sweet exudation. One species, *Ogyris olane* (Hew.), apparently does not possess these secretory glands, because it is not attended by ants. Each of the other species whose larva is known is attended by its own particular kind of ant.

Pupæ are found in similar situations to the larvæ, i.e., under bark, in ants' nests, etc.

Ogyris zozine araxes nov.

This is the largest species of the genus, and in Victoria has been recorded by the writer from Horsham (November, 1930). Other recorded Victorian localities are Dimboola and Flattah (Waterhouse and Lyell). The male butterfly is a uniform shining purple on the upper surface and dark grey with darker markings on the under side. The female has the upper surface of the wings black, with a discal patch on the forewing, cream. Basal and central areas of forewings and hindwings, metallic green. Under-side black-brown, suffused with richer and darker markings, cream patch of forewing upper-side visible, slightly more suffused.

The eggs are laid on the twigs of the food plant (*Loranthus pendulus*), and occasionally on the bark near the base of the tree and the attending ants' nest.

It is thought that the young larvæ, upon hatching, are carried to and from their hiding place in the ants' nest to the *Loranthus* to feed, for it must be remembered that the food may be many feet away from the base of the tree, and the ants' nest may be under stones near the base, or in a dead portion of the basal portion of the trunk. When the larvæ grow bigger, they are able to migrate backwards and forwards to and from their food, although the ants are in attendance with them on their journeys.

No doubt the continual presence of the ants must tend to guide them to a certain extent. When fully fed, the larvæ retire to within the shelter of the ants' nest, and there undergo the transformation into pupæ.

In colour the full-grown larvæ are pinkish brown, with darker, obscure markings. The lateral margins are clothed with fine, pale-coloured hairs. The secretory tubercles are very conspicuous in this species, and can be thrust out or withdrawn at will.

Pupæ are smoky black in colour, and are attached to some object within the ants' nest. Attachment is made by the tail, and round the body, about the centre, a silken girdle passes.

When ready to emerge, the adult butterfly crawls out of the exit used by the ants, being guided, no doubt, by the light from outside. The ants attending this *Ogyris* are a large species of sugar ant (*Camponotus perthiana*).

The life cycle may be set out as follows:—Eggs laid during November and December, young larvæ in January and February; full-grown larvæ in October and November, pupæ in November and December, and butterflies again during those two months. Thus it can be seen that the complete life cycle occupies one whole year. In Queensland this species has a spring and autumn brood.

Ogyris amaryllis meridionalis (Beth. Baker).

A very beautiful species, smaller than the foregoing one. It was taken at Horsham by the writer in November, 1930. Other recorded Victorian localities are Dimboola, Sea Lake, Kewell, Birchup (Waterhouse and Lyell), Stawell and Hattah (J. Hill) and the western Mallee generally.

The male butterfly on the upper side is a brilliant shining metallic blue; the under side is dark brown with darker markings, those in the cell of the forewing being edged metallic blue. The female on the upper side is metallic blue, tinged purple, with the outer margins broadly black. The under side is as the male under side, only that the cell bars are scarlet-orange.

The eggs are laid, singly or in pairs, on the twigs of the food-plant (*Loranthus linophyllus*). The young larvæ on emergence probably remain on the mistletoe plant until they grow a little, during that time hiding under mistletoe bark and in crevices. They are constantly attended by a small black species of ant, and it is useless looking for larvæ upon trees on which these ants are not present, no matter how heavily infested with *L. linophyllus* they may be.

Larvæ, from half-grown size and upwards, may be sought for near the base of the tree; they seem to prefer loose bark, under which they hide singly, and bark that lies in the path or "run" of the attending ants. Another curious fact is that more than 90

per cent. of the larvæ taken by the writer last year were found either on the northern or eastern sides of the trees.

The full-grown larva is dark brownish-black in colour, the whole body surface is rugged, and the larva in general presents a slug-like appearance. This flattened (dorsally) appearance and seclusive slug-like habit is characteristic of almost all *Lycænid* larvæ. The pupa is dark brown-black, and is attached by the tail and a central girdle. It is found in holes, under bark, or in crevices on the trunk (usually near the base) of the *Loranthus* host tree.

The life cycle may be set out as follows:—Eggs laid during October and November; larval existence from November until January; pupæ in January and February; adult butterflies from the latter part of February until the end of March. Eggs laid again during February and March; larvæ from April until August; pupæ from August until October; adult butterflies again in November. Thus there are two broods during the year, one in early summer, the other in autumn or late summer.

Ogyris idmo waterhouseri (Beth. Baker).

This very rare and apparently local species has so far been recorded only from Dimboola and the Grampians—near Hall's Gap (J. Kershaw). Its life history has so far not yet been worked out, so it is not definitely known whether it is a *Loranthus* feeder or not. In Western Australia, where the typical species, *O. idmo idmo*, is not uncommon, it has been recorded as flying near the ground, and always round a certain kind of creeper, which grows on and near the ground (J. Clark). It is likely that this creeper may later prove to be the food plant.

The male butterfly on the upper side is coloured as follows:—Forewing dull purplish-brown, apex and margin brown-black. Hindwing dull purplish-brown, margin narrowly brown-black. Female above, forewing brown, basal half bluish purple, a discal patch cream; hindwing brown, central area bluish purple. Male beneath, brown-black suffused greyish, with darker typical markings. Female beneath, as in male, but hindwing with a central brown suffusion.

The life cycle of this interesting species is almost certain to occupy one year, and thus it is single-brooded, because all the examples so far captured have been taken in November. During November, 1930, a careful search for this species was undertaken, and the following localities were visited:—Dimboola, Horsham, Hall's Gap and Mount Victory (Grampians) and Pomonal. But no signs of it were seen. This would seem to indicate that it is very local, and confined to certain spots which it frequents and where it breeds every year. This local habit occurs with a good many species of *Lycænidæ*, and, although their food trees may

be abundant and spread over a very large area, yet a particular species may be confined to two or three trees, here and there, in that area.

Ogyris abrota (Westw.).

This member of the genus is perhaps commoner and more widely spread than any of the foregoing species. It is, however, rapidly becoming scarce, owing to the fact that so many of the trees bearing its food plant (*Loranthus celastroides*) are being cut down. The writer has bred it from Broadmeadows, Spring Vale, Mordialloc, and Vermont; other recorded localities are Gisborne (G. Lyell), Castlemaine, Stawell, Oakleigh, and Wandin (Waterhouse and Lyell), and Frankston (A. Brown). There are no doubt many other recorded localities also.

The male butterfly on the upper side is a rich dark purple, with the outer margins narrowly black. On the under side the forewing is black with the cell bars edged whitish. The hindwing is brown with faint whitish splashes and richer brown central markings (typical). The female above is brown-black, with a large pale lemon-coloured patch just from the outer end of the cell in the forewing. Under side as in male, except that the pale lemon-coloured patch of the forewing is visible as above, though slightly more obscurely.

The eggs are laid on the twigs of the food plant (*L. celastroides*). The young larvæ are pinkish brown in colour, and hide by day under the loose bark of the food plant. Right throughout their larval existence they do not seem to wander very far from the mistletoe, not to the same extent as larvæ of *O. sosine araxes* or *O. amaryllis meridionalis*. Occasionally one will get a fully-grown larva under bark near the base of the host tree, but it is usual to get them when fully grown under bark only a few feet away from the mistletoe itself. They are always attended by a species of small black ant. In colour the full-grown larva is pale pinkish-brown, with faintly-darker markings dorsally. Excretory tubercles are present, but are not nearly so conspicuous as in *O. sosine araxes*.

Pupæ are found in situations similar to those frequented by the larvæ; they are attached by the tail and a central girdle. In colour they are pale ochreous, with small, irregular, darker markings and striations.

The life cycle may be set out as follows:—Eggs laid during October and November; larvæ from November until January; pupæ during January and February; butterflies in February and March. Eggs laid again in March and April; larvæ from April till July and August; pupæ August to October; butterflies in October. This species then is double-brooded, the first brood appearing in spring, the second in late summer.

Larvæ of *O. abrota* appear to be much attacked by Dipterous parasites, particularly in the summer brood; the extent of parasitism sometimes is as high as 50 per cent. During prolonged wet weather (especially if hot, thus creating high humidity), they are also sometimes attacked by a fungoid disease, which takes heavy toll of their number.

The *Loranthus celestraides* appears to favour for its host tree the red gum (*Eucalyptus rostrata*); this tree formerly was plentiful around Melbourne, and heavily parasitised—a fact that no doubt accounts for the moderate abundance of *O. abrota* until about 10 or 15 years ago. *O. abrota* is now becoming restricted to a few favoured localities, where its food plant still remains.

Ogyris olivæ (Hew.).

This is perhaps the most abundant and widely-spread species of the genus in Victoria; in fact, it is rarer, if anything, in New South Wales than in this State, and quite rare in southern Queensland. The writer has taken it at Ferntree Gully, Vermont, Stawell, Ringwood, Eltham, Broadmeadows, Bacchus Marsh, and Blackburn. Waterhouse and Lyell record it from many other localities in Victoria.

In size it is about the same as the preceding species, *i.e.*, about $1\frac{1}{2}$ inches across the expanded wings. The male butterfly on the upper side of the wings is dark brown-black, with central basal areas of dull purple. The apices of the forewings are faintly splashed white. Beneath the wings are dull black, with greyish suffused markings, and the typical markings outlined only in black. The female above has the wings brown-black, as in the male; the central basal areas are not quite so large, and are bluish-purple; the apices of the forewings are faintly splashed white. The under side is as in the male, but the markings are slightly more intense in colour.

The eggs are laid on the twigs of the food plant (*Loranthus pendulus*). The young larvæ are ochreous in colour; and for the first two instars do not travel far from the mistletoe itself to find suitable hiding places. As they grow, however, they develop a very wandering habit, and seem to like to get as far as possible from the mistletoe during the day time—this is the general rule—because right near the base of the host tree, under loose bark, etc., is the best place to look for them. Occasionally, however, one will find an odd larva some feet up from the base of the tree. This species is not attended by ants, and of the *Ogyris* whose life histories are known is the only one whose larvæ are not attended thus.

The full-grown larva is ochreous brown in colour; individuals vary considerably from dark to light ochreous; the dorsal surface is rugose, and on the second anterior and anal segments (dor-

sally) is a flattened depression, bearing a somewhat T-shaped mark.

The pupa of this species is very similar to that of *O. abrota*; it is, if anything, slightly smaller and darker brown in colour, and found in situations similar to those affected by the larvæ. It is attached by the tail and a central girdle.

The life cycle may be set out as follows:—Eggs laid during October and November; larvæ from November until January; pupæ in January and February; butterflies again in February and March. Eggs laid again in March and early April; larvæ from April until August; pupæ in August and September, and butterflies again in October. There are, therefore, two broods during the year, one in late spring or early summer, the other in late summer or early autumn.

In some years this butterfly occurs more plentifully than in others; in 1921 it seemed to be plentiful everywhere; in 1930, however, it was scarce in localities where it could normally always be found. Specimens are usually more numerous during the late summer brood than in the spring one.

Genus *Miletus* Hubner.

Miletus ignita ignita (Leach).

This very interesting species, which has a very wide range in Australia (Darwin to Victoria and W.A.), belongs to a genus the butterflies of which are not only brilliantly coloured above, but have a definite pattern of reddish and metallic-green markings on their under sides. In many species of the genus, which has 13 representatives (exclusive of sub-species) in Australia, the markings on the under sides of the wings are often more beautiful than those on the upper sides.

On account of its wide geographical range in this continent, *Miletus ignita* has developed no fewer than four races, which are all clearly defined. The typical race, *M. ignita ignita* (Leach), occurs throughout Victoria (it is very local in this State), as far north as Brisbane. The North Queensland race is known as *M. ignita chrysonotus* (Grose-Smith), and ranges from about Stradbroke Is. to Cairns and Cape York. The Darwin race is *M. ignita erythrina* (Waterh. and Lyell), while the race which occurs around Albany, in Western Australia, is *M. ignita oliffi* (Miskin).

The writer has only taken *M. ignita* at Ocean Grove, in Victoria (larvæ during November, 1930, and again, in the same month, in 1931); but other records for this State by Waterhouse and Lyell are Redesdale and Dimboola.

This species appears to have a number of different food plants. At Ocean Grove, larvæ feed on Golden Wattle (*Acacia pycnantha*); around Sydney it has several food plants, and the writer has bred it in North Queensland from different plants again.

The eggs are laid on the bark near the base of the food plant, and are only laid on such plants as have nests of the necessary attending ant, *Iridomyrmex nitidus*, at or near their bases. Almost as soon as the eggs have been laid, the ants cover them in debris, etc., under which the insects extend their nest. When they are very young, the ants probably carry the larvæ to the young shoots of the food plant. Dr. C. A. Waterhouse, of Sydney, in the *Australian Museum Magazine* (July-September, 1931), gives a very interesting account of the life history of this species. He mentions that "the larvæ, when still young, are guided by the attending ants to and from their hiding place in the ants' nest to the leaves on which they feed. Should the caterpillars when going out to feed or when returning to their hiding place take a wrong turning, an ant will come and turn them in the direction in which they should go."

The present writer has observed that the larvæ, in going to and from their shelter in the ants nest at the base of the food tree, always travel in the ant track, where the ants are continually bumping into them, and tending them with the utmost care. This particular ant has a very strong and not unpleasant odour, which can be smelt immediately a nest is opened or disturbed, and perhaps this odour helps to guide the larvæ on their journeys. These larvæ have secretory glands on the posterior segments of their bodies (this is a characteristic of most Lycaenid larvæ) and on account of this the ants "milk" them to secure this much prized fluid. Even when the larvæ are on the leaves feeding, the ants are in continual attendance.

These caterpillars have a peculiar manner of feeding; instead of eating portions out of the leaves, as do most larvæ, they skeletonize the leaves, *i.e.*, they eat off the epidermis from one or both surfaces of the leaves; this gives the leaves a scorched appearance, and is a useful guide when searching for the larvæ. It is interesting to note that larvæ are only found on very young trees, usually those about two feet in height.

The fully grown larvæ are blackish-brown in colour, with darker and irregular dorsal markings. The sides of the bodies are fringed with pale greyish hairs.

Pupæ are found in the ants' nests; they are usually attached to the trunk of the food tree around which the ants build their nest, excavating the earth away from it for a little distance. Like the larvæ, pupæ occur in numbers together; as many as 30 may be found at the base of one small food tree. In colour they are blackish-brown with minute dotted darker markings. They are attached by the tail and a central girdle.

The male butterfly has the wings above dull coppery purple with the margins brown. Beneath, the wings are dark grey brown with a series of orange-red spots edged metallic green. The female

above has the wings brown with a very faint coppery tinge, the central areas are purple, sometimes tinged blue. The underside is similar to the male, but the orange-red spots are larger if anything.

In New South Wales and Queensland the species is double brooded, but in Victoria there is only one brood, which emerges in December and January. The eggs are laid about January; young larvæ appear about a month later; they grow very slowly during the autumn and winter months, reaching the pre-adult instar in October. They grow fairly rapidly from then on and pupate in November. The pupal stage lasts for about a month and the adult butterflies emerge in December and January.

Although so brilliantly marked, *Miletus ignita* is very inconspicuous on the wing; it flies very rapidly, but can be easily approached when at rest on a twig or a leaf. It measures about one inch across the expanded wings, and, although not so large as butterflies of the genus *Ogyris*, is equally as interesting and as much a prize for the collector.

PIONEERS IN THE PLANT WORLD: NOTES ON LICHEN-STUDY.

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There are many aspects of lichen study that should appeal to nature lovers; the unusual variety in form and colour of the plants is a great attraction, and also that they may be found in almost every kind of situation and locality—they are never far to seek. Another distinct advantage is the ease with which they may be preserved.

In form lichens vary from flat crusts that spread unobtrusively over the bark of trees, over rocks, etc., to the leafy, shrubby or filamentous forms of large dimension familiar to all botanists. The prevailing colours vary from a greenish or bluish dove-grey, white or yellow to the most brilliant red hues. The only harm charged against them is that the larger forms on trees, if unchecked, exercise a somewhat smothering effect.

As plants they are unique, not only in the outward form, but more especially in their constitution. An examination of their tissues under the microscope reveals the presence of two very distinct elements: groups of small green or blue-green, mostly rounded cells, along with long, colourless strands of cells—the hyphæ—which form the medulla and the cortical elements of the plant body or thallus. That these are respectively algae and fungi is now a matter of common knowledge, but for long years presented a much-debated puzzle. The algae are aerial species belonging to a few genera of Chlorophyceæ or Cyanophyceæ; it is